

High Heat-Load Absorbers for the APS Storage Ring

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Abstract

The power density of the dipole x-rays in the 7-GeV APS storage ring is 261 watts/mrad at 300 mA of beam current. An array of absorbers is used in the ring to shield its vacuum chambers and diagnostics components in the path of these intense x-rays. This paper describes some of the unique absorber designs that were developed to handle the requirements of high power density and UHV compatibility with no water-to-vacuum joints.

Keywords: Absorbers, Storage Ring, High Heat-Load

1. Introduction

The Advanced Photon Source (APS) is a third-generation light source that provides high-brilliance x-ray beams for scientific research. At present the APS storage ring is operating at its Phase 1 specification of 7-GeV of beam energy and 100 mA of beam current. The beam current in the future will increase to its Phase 2 design value of 300 mA.

There are 80 bending dipoles of field strength 0.6 T in the 1.1-km-long storage ring. Each dipole bends the circulating electron beam by 4.5 degrees (78.5 mrad), generating a highly intense x-ray fan tangent to the beam trajectory. The vertically integrated power density of the x-ray fan is 261 watts/mrad at 300 mA. Only approximately 6 mrad of this fan exits through the exit port onto the beamline's front-end components (see Fig. 1). The rest of the fan is intercepted by an array of high heat-load absorbers designed to protect the vacuum

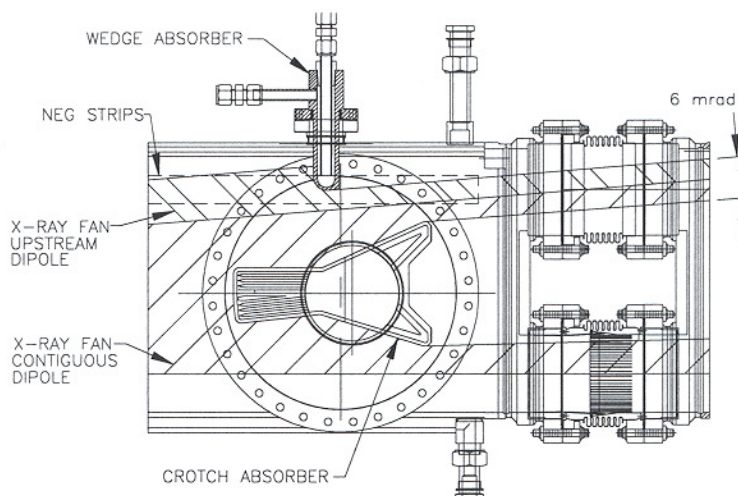


Fig. 1: Absorbers in a dipole chamber of the APS storage ring.